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AMENDMENTSIn the ClaimsCurrent Status of Claims

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- 1 37.(withdrawn) A circular extrusion die comprising
- 2 distribution section for forming at least a first molten polymer material into a generally even
- 3 circular flow, and
- 4 bodily separate from said distribution section an exit section comprising

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Response to 13 August 2007 Notice of Non-Compliant Amendment

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2/22/2007 10:03:21 AM Name: ROBERT W STROZIER, PLLC

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PAGE 3/16 * RCVD AT 10/1/2007 1:03:21 PM (Eastern Daylight Time) * SVR:USPTO-EFXXRF-2/15 * DNIS:2738300 * CSID:7139777011 * DURATION (mm-ss):06-12

1 an annular main channel with generally cylindrical or conical walls for receiving said generally
2 circular flow of said first polymer material and conducting the same to an annular exit orifice to exit
3 there from as a tubular film structure,

4 said exit section also comprising a channel system spaced radially from said main channel
5 for extrusion from the circumference of said exit section of a circular array of narrow strands of a
6 second molten polymer material,

7 said channel system ending in a circular row of internal orifices opening into a circular wall
8 portion of the main channel upstream of said exit orifice so that said circular array of said second
9 polymer material merges with the circular flow of said first polymer material as circumferentially
10 spaced strands superimposed on said circular flow.

1 38.(withdrawn) A circular extrusion die according to claim 37 wherein said channel system
2 for said circumferential extrusion begins at at least one inlet in said exit section and comprises

3 for delivering said second polymer material to each said internal orifice a labyrinthine sub-
4 channel system communicating at one end with such inlet and at the other end with the respective
5 internal orifice,

6 said sub-channel system comprising at least three channel-branchings between said ends to
7 promote a balanced division of polymer flow to said internal orifices.

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1 74.(withdrawn) A circular extrusion die according to claim 38 which further comprises a
2 small circumferential channel in said wall portion of said circular main channel upstream of the exit
3 thereof, said internal orifices opening in common into said small channel.

1 75.(withdrawn) An extrusion die according to claim 37 which further comprises an additional
2 circular channel for extruding a circular flow of a third molten polymer material on the side of said
3 generally circular flow of said first polymer material facing said circular array of narrow strands of
4 said second material upstream of the point where the circular array merges with first circular flow
5 to thereby form on the first circular flow of said first polymer material a continuous layer of said
6 third polymer material underlying said circular array of narrow strands upon its merger with the first
7 circular flow.

1 76.(canceled)

1 77.(currently amended) The A cross-laminate according to claim 76118 wherein:
2 the pattern of the discontinuous layer of the film A comprises at least one first array of
3 substantially parallel strands,
4 the pattern of the discontinuous layer of the film B comprises at least one second array of
5 substantially parallel strand, and
6 the strong bonds comprise crossing points of the two arrays formed by direct lamination the

~~strands in the respective arrays are in contact with one another at their crossing points and are of a polymer material such as to be directly laminated to each other at said crossing points.~~

78.(currently amended) The A cross-laminate according to claim 76119, wherein:

The polymer material of the strands of at least one of said arrays discontinuous layer of at least one of the films A and B comprises coloration material in an sufficient amount, a coloration, or an amount and coloration sufficient to render the strands at least one colored discontinuous layer visible through at least one side of the cross-laminate.

79.(currently amended) The A cross-laminate according to claim 76118, wherein:

the a thickness of the discontinuous layers strands in the first surface layer of each of said the films A and B is are not greater than 20% of the a thickness of their respective films.

80.(currently amended) The A cross-laminate according to claim 76118, wherein:

the a collective area of the discontinuous layers of the films A and B comprises strands in each of said first surface layers constitutes not no more than 60% of the a surface area of the their respective film sides.

81.(currently amended) The A cross-laminate according to claim 76118, wherein the a thickness increase in each of said the films A and B at the locations where the strands discontinuous layers are present is at most 20% of the a film thickness in adjacent strand-free regions thereof where the discontinuous layer are absent.

82.(currently amended) The ~~A~~ A cross-laminate according to claim ~~7677~~, wherein ~~the~~ a distance from ~~the~~ a center-to-center of adjacent pairs of strands in each array is between 2 mm and 40 mm.

83.(currently amended) The A cross-laminate according to claim 76119, wherein:

the lamination a strength at said crossing points of the thin strands of said arrays is of the strong bonds are at least 40 g cm⁻¹, as measured by a peel test carried out on narrow specimens of the cross-laminate at a velocity of about 1 mm sec⁻¹, and

and the lamination a strength in the strand-free regions is of the weak bonds are less than or

1 the films A and B is are not greater than 10% of the a thickness of their respective film.

1 95.(currently amended) The A cross-laminate according to claim 76118, wherein
2 the a thickness increase of each of said the films A and B at the locations where the strands
3 are discontinuous layer is present is at most 10% of the a film thickness in strand-free regions of the
4 films free of the discontinuous layer.

1 96.(currently amended) The A cross-laminate according to claim 76119, wherein:
2 the lamination a strength of the weak bonds is no in-said-strand-free regions of said cross-
3 laminate is not more than 50% of the lamination a strength of the strong bonds at said-crossing
4 points of the strands thereof, as measured by a peel test carried out on narrow specimens of the
5 cross-laminate at a velocity of about 1 mm sec⁻¹.

1 97.(currently amended) The A cross-laminate according to claim 7678, wherein the cross-
2 laminate has having a thickness at the highest its thickest of about 0.3 mm, and:

3 wherein a said film A is situated at one of its sides,
4 said film A having its an exterior surface of the film A is corrugated to form a visible pattern
5 of striations extending in one direction,

6 with the where a spacing of said the striations in said pattern being at most about 3 mm,
7 the main layer and said second surface the bonding layer of said the film A are substantially
8 transparent to enable the coloured colored strands to be visible when the laminate is observed from
9 an A-side one of the exterior surfaces of the cross-laminate, and

10 the a depth of the corrugations is sufficient to impart a three-dimensional effect to said the
11 cross-laminate such that the strands appear to be spaced internally from the exterior surface of said
12 the film A a distance substantially greater than the an actual maximum thickness of said the film A.

1 98.(currently amended) The A cross-laminate according to claim 76118, wherein:
2 said first surface layer on the discontinuous layers of each of the films A and B constitutes
3 at their highest 5% of the volume a height of their corresponding film

1 99.(currently amended) The A cross-laminate according to claim 76118, wherein:
2 the average melting point of the polymer material which constitutes the strand-formed first

surface layer of each of said the films A and B is at least about 20°C lower than the average melting point of the polymer material which constitutes the main layer thereof.

100.(currently amended) The ~~A~~ cross-laminate according to claim ~~76~~118, wherein the distance from center-to-center of adjacent strands of each said the first surface layer is not greater than 20 mm.

101.(~~withdrawn~~) A method of manufacturing a cross-laminate comprising at least two polymer films A and B which comprises:

separately forming each of said the at least two films A and B by coextruding:

a main layer of a polymer material selected to give high tensile strength,

a discontinuous first surface layer of a different polymer material forming an array of thin strands extending in the direction of extrusion and

interposed between said the main layer and its first surface layer a continuous second surface layer of a different polymer material

and imparting to each of said the polymer films a uniaxial or unbalanced biaxial molecular orientation;

bringing said the films A and B together in sandwich relation with said the main directions of orientation in crossing relation with the said the arrays on mutually facing sides of said the films and the directions of the strands in said the arrays in crossing relation and

laminating said the films A and B together at least partly by heating to form a laminate;

selecting the polymer material of said the continuous second layers to control the lamination strength in the strand-free regions thereof; and

selecting the polymer material of the strands of the each such array to control the lamination strength at the crossing points of the strand arrays such that the lamination strength is highest at the strand crossing points.

102.(withdrawn) The A method according to claim 101 wherein:

at least one of said the films A or B is coextruded as a tubular film,

orientation is imparted to said the tubular film by drawing down the same while twisting to give a helical direction of orientation thereto,

and comprising the further step of:

1 embossing at least the exterior surface of said the film A into corrugations forming a pattern
2 of striations extending in one direction with corresponding thickness variations in said the film,
3 the separation between the striations in said the pattern being not more than about 3 mm and
4 the depth of the corrugations being sufficient to impart a three-dimensional effect to the
5 cross-laminate such that the strands when viewed from the A-side appear to be spaced internally
6 from the exterior surface of said the film a distance substantially greater than the actual maximum
7 thickness of said the film A.

1 112.(withdrawn) The A method according to claim 111 wherein: said the embossing is carried
2 out by:

3 passing said the films A and B after they have been brought together in sandwich relation
4 and:

5 before or after said the films have been laminated through at least one pair of mutually
6 intermeshing grooved rollers to form said the corrugations while simultaneously effecting a
7 transverse stretching of the same.

1 113.(withdrawn) The A method according to claim 101 wherein:

2 the separate coextrusions of said the films A and B are so controlled that the relative rates
3 of extrusion flow of the polymeric materials of said the main, second and first surface layers of said
4 the films A and B are such that said the first surface layer on each of the films A and B constitutes
5 at the highest 5% of the volume of the respective film A or B.

1 114.(withdrawn) The A method according to claim 101 wherein:

2 the average melting point of the polymer material of said the stand-formed first layer of each
3 of said the films A and B is at least about 20°C lower than the average melting point of the polymer
4 material of the main layer thereof.

1 115.(withdrawn) The A method according to claim 102 wherein:

2 said the first surface layer of said the tubular film is coextruded discontinuously so that the
3 distance from center-to-center of adjacent strands thereof is at most 20 mm.

1 116.(withdrawn) The A method according to claim 101 wherein: said the laminating comprises:

1 extruding between said the films A and B an intermediate layer of a molten polymer material
2 selected to effect lamination of the films as they are brought together in sandwich relation and
3 cooled.

1 117.(withdrawn) The ~~A~~ method according to claim 101 which further comprises

2 coextruding at least one of said the films A and B with a said the discontinuous surface layer
3 on both of its sides,

4 separately coextruding a film C having a said the main layer with a said the first
5 discontinuous surface layer and a said the second continuous surface layer on at least one of its sides
6 and

7 laminating said the film C to an exterior side of at least one of said the films A and B with
8 the first surface layer of film C facing said the exterior side before, during or after films A and B are
9 brought together in said the sandwich relation to laminate the said the films A, B and C together,
10 the polymer material of the surface layer of said the film C being selected in association with
11 the lamination conditions to produce a stronger lamination at the crossing points of the strands of
12 its first surface layer and the strands of the adjacent first surface layer of said the film A or B than
13 in the strand-free regions thereof.

1 118.(new) A cross-laminate comprising:

2 a first coextruded film A having a main direction of molecular orientation and including:

3 a continuous main layer comprising a polymer material having a high tensile
4 strength,

5 a patterned discontinuous layer disposed on a surface of the main layer, where the
6 discontinuous layer comprises a different polymer material,

7 a second coextruded film B having a main direction of molecular orientation and including:

8 a continuous main layer comprising a polymer material having a high tensile strength,

9 a patterned discontinuous surface layer disposed on a surface of the main layer,
10 where the discontinuous layer comprises a different polymer material,

11 where the film B is arranged so that the main direction of the film B crosses the main
12 direction of the film A and the pattern of the discontinuous layer of the film B
13 crosses the pattern of the discontinuous layer of the film A, and

14 strong bonds bonding the films together at intersections of the pattern of the discontinuous

1 layer of the film A and the pattern of the discontinuous layer of the film B,
2 where the films A and B are either uniaxially or unbalanced biaxially molecularly oriented.

1 119.(new) The cross-laminate according to claim 118, further comprising:
2 a continuous bonding layer interposed between the main layer and the discontinuous layer
3 of each of the films A and B and
4 weak bonds formed between the bonding layers of the films A and B in regions of the films
5 free of the discontinuous layers.

1 121.(new) The cross-laminate according to claim 118, further comprising:
2 moderate bonds formed between the bonding layer of one the films A or B and the
3 discontinuous layer of the other film B or A.

1 122.(new) A cross-laminate according to claim 118, wherein:
2 the film A further including a patterned second discontinuous layer disposed on a second
3 surface of the main layer, where the second discontinuous layer comprises a different polymer
4 material, and
5 the cross-laminate further comprising:
6 a second B film arranged so the main direction of the second B film crosses the main
7 direction of the film A and the pattern of the discontinuous layer of the second B film
8 crosses the pattern of the second discontinuous layer of the film A,
9 second strong bonds bonding the second B film to the film A together at intersections of the
10 pattern of the second discontinuous layer of the film A and the pattern of the discontinuous layer of
11 the second B film ,
12 where the second B film is either uniaxially or unbalanced biaxially molecularly oriented.

1 123.(new) The cross-laminate according to claim 120, further comprising:
2 a continuous bonding layer interposed between the main layer and the discontinuous layer
3 of each of the film A, the B film and the second B film and
4 weak bonds formed between the bonding layers of the films A and B and the films A and the
5 second B film in regions of the films free of the discontinuous layers.